

REMARKS**A. SECTION 112 REJECTIONS**

The office action asserts that "shells about a common axis" is ambiguous. Despite our belief that the phrase "shells about a common axis" is not ambiguous, we amended claim 19 to specify that each shell has an axis of rotation, and the shells axes are the same. Shells have an axis. The axis of a shell such as the cylinder shown at the right follows the dashed line "h." Though applicants' shells may taper, they still have a similar axis. Insofar as someone may say that a cylindrical shell has an infinite number of axes of rotation, applicants mean the longitudinal axis... If this change does not solve the problem the office action envisions, we should discuss what you believe to be suitable language.



New claim 22 uses different language. We believe it has no § 112 issues.

B. REJECTION UNDER § 103(a)

The combination of Lichtenthaeler in view of Schnitzer and Hervert fails to make a *prima facie* case of obviousness.

Applicants' process purifies contaminated liquid. At least two shells rotate about a common axis at a high angular velocity. Contaminated liquid is injected into the first of the shells. The shells' angular velocity is sufficient to cause the injected liquid to form a film along the inner surface of the first shell. The injected contaminated liquid boils along the inner surface. In a preferred embodiment, the shells are under very low pressure or vacuum so that the injected fluid boils near room temperature. The resulting vapor is pure. The liquid remaining on the inner surface contains the contaminants that were present in the incoming contaminated liquid. It is collected and removed.

A compressor directs the purified vapor into the other shell. Doing so raises the pressure and the resulting temperature of the vapor. The vapor condenses as purified liquid on the outer surface of the first shell. The outer surface of the first shell is at a lower temperature for condensation because boiling the

contaminated liquid reduces the temperature, and the condensation energy transfers heat from the outer surface of the first shell to the liquid film. The rotation-generated centrifugal force drives the purified liquid off the other surface of the first shell against the inner surface of the second shell.

The system collects the purified liquid from the output end of the second shell (the end opposite where the vapor came between the two shells). The system collects the more concentrated contaminated liquid from the output end (end opposite where it was injected) of the first shell.

Applicants' system is every efficient because of the high heat transfer rates that film boiling and drop wise condensation due to rotation causes. The system needs only one energy source, the compressor that compresses the vapor. Any pump that generates a vacuum uses small amounts of energy and has a low-frequency duty cycle running intermittently. Heat transfer for vaporizing the incoming liquid comes from the heat of condensation on the outer side of the shell, and vaporization cools the shell so that the vapor condenses on the outer surface of the shell.

Before discussing the cited references, we find that the § 103(a) rejection does not discuss the claimed steps and explain which reference shows each step. Normally, office actions relying on § 103(a) should apply the test of *Graham v. John Deere Co.*, 383 U. S. 1, 17–18, 86 S. Ct. 684, 15 L. Ed. 2d 545, 148 U.S.P.Q. (BNA) 459 (1966) (“[T]he scope and content of the prior art are ... determined; differences between the prior art and the claims at issue are ... ascertained; and the level of ordinary skill in the pertinent art resolved.”). See M.P.E.P. ¶ 706.02(m) (Sept. 2007). Neither the first office action nor the present one states which claimed steps each reference alleged teaches.

When making an obviousness rejection, Office personnel must therefore ensure that the written record includes findings of fact concerning the state of the art and the teachings of the references applied. In certain circumstances, it may also be important to include explicit findings as to how a person of ordinary skill would have un-

derstood prior art teachings, or what a person of ordinary skill would have known or could have done. Factual findings made by Office personnel are the necessary underpinnings to establish obviousness.

Once the findings of fact are articulated, Office personnel must provide an explanation to support an obviousness rejection under 35 U.S.C. 103. 35 U.S.C. 132 requires that the applicant be notified of the reasons for the rejection of the claim so that he or she can decide how best to proceed. Clearly setting forth findings of fact and the rationale(s) to support a rejection in an Office action leads to the prompt resolution of issues pertinent to patentability.

M.P.E.P. § 2141 (Sept. 2007). Because the office actions rely on obviousness, each reference must lack a teaching of at least one claim step. The conclusion of obviousness, i.e., a *prima facie* case, next requires a reason for using a teaching of one or more references for the missing step(s) in another reference. Though a ritualistic “teaching, suggestion, or motivation” test is not required, *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. ___, 127 S. Ct. 1727, 1741-42, 167 L. Ed. 2d 705, 82 U.S.P.Q. 2d (BNA) 1385, 1391 (2007), “there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *Id.*, 127 S. Ct. 1741. “Office personnel must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art.” M.P.E.P. ¶ 2141.

When determining whether a claim is obvious, an examiner must make “a searching comparison of the claimed invention – including *all its limitations* – with the teaching of the prior art.” *In re Ochiai*, 71 F.3d 1565, 1572 (Fed. Cir. 1995) (emphasis added). Thus, “obviousness requires a suggestion of all limitations in a claim.” *CFMT, Inc. v. Yieldup Int’l Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003).

To support the rejection of claim 19, the PTO must do more than merely “consider” every feature for this claim. Instead, the asserted combination of three patents also must teach or suggest each and every claim feature. See *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974) (emphasis added) (to

establish prima facie obviousness of a claimed invention, all the claim features must be taught or suggested by the prior art). Indeed, the board recently confirmed that proper obviousness determinations require examiner to make "a searching comparison of the claimed invention – *including all its limitations* – with the teaching of the prior art." See *In re Wada*, Appeal No. 2007-3733 (B.P.A.I. 2008; copy attached and emphasis in original).

Further, every feature must be present in the applied prior art to make the required "ascertaining the differences between the claimed invention and the prior art." *Graham*, 383 U.S. at 17. Indeed, applicants submit that this is why M.P.E.P. § 904, instructs examiners to conduct an art search that covers "the invention as described and claimed," follows *Graham's* requirements.

The office action merely concludes that the three cited reference together teach the claimed invention (we disagree) without explaining what each teaches, what each does not teach and why combining the teachings would be obvious to a person of ordinary skill in the art.

The present office action relies upon the following references for the § 103(a) rejection:

Lichtenthaeler, Patent No. 1,819,517, describes a heat exchanger made of multiple parallel tubes and/or concentric shells. These concentric shells or parallel tubes are arranged in the patent for packing them into a small volume. Liquid-to-liquid (no phase change) heat transfer occurs through conduction across the tubes.

The May 15, 2007, office action, which the current office action refers, the states:

Lichtenthaeler discloses substantially the process as claimed. The method/process of either of the above references differs from the claimed invention in that claim 19, for example, recites "... applying a pressure to the purified vapor to raise the pressure of the purified vapor..." However, said step is conventionally done in the art as taught, e.g., by Schnitzer in col. 5, lines 60-67 through col. 6, lines 1-39.

Not so. Lichtenthaeler lacks the following steps:

1. rotating at least a pair of first and second shells;
2. injecting contaminated liquid at the input end of the rotating first shell;
and
3. the rotation of the concentric shells is at an angular velocity sufficient for any liquid on the inner surface to form film boiling along the inner surface due to g forces on the liquid generated by the rotation of the shells.

This office action quotes extensively from Lichtenaeler's reference to distillation. However, the distillation is not occurring in the patent; the patent merely heats liquid in the patent's heat exchanger so that distillation can occur downstream. Distillation occurs in applicants' claimed process, however.

Though, as the office action states, "An artisan would appreciate that 'distillation' would necessarily includes a combination of boiler and condenser," that is irrelevant when the cited reference does not have structure to perform the claim method steps in the claimed method.

Our previous response did mention that in Lichtenthaeler, "The liquid moves in a circle because it is pumped between cylinders." We did that because we do not believe the reference is relevant and we looked for some reason why the office action applied it. Frankly, the circular movement was our guess.

Schnitzer, Patent No. 3,904,122, discusses a vapor distillation system based on rotating disks. Although the rotation generates g forces, the liquid is not subjected to very high g forces to enhance the vaporization and condensation as applicants do. Schnitzer heats disks 2 so that as spray ring 38 sprays sea water onto the heated disks, some water turns to steam. Any remaining liquid is more concentrated brine. The rotation cause that brine to move off the disk tangentially. The concentrated brine then is sprayed onto the other disk. The hot disk generates steam, and the brine remaining on the disk is more concentrated.

The liquid in applicants' process has a longer "residence time" in their concentric shells compared with parallel disks. The fluid on Schnitzer's disks under rotation does not experience the same "g-forces" when sliding along a disk (in shear) compared to applicants invention, which "contains" the fluid in the boiler along a substantially parallel shell.

Schnitzer also operates at high temperature. Col. 3, lines 63-67. Thus, heat exchanger 32 heats the water to near boiling before it enters the disks. Col. 4, lines 39-42. Applicants' invention typically operates at lower temperatures, pressures and much lower ΔT . Though we do not submit declarations to attest to that, one of ordinary skill reading applicants' application would appreciate that it would work at a much lower temperature and a small ΔT .

For a *Graham* analysis, Schnitzer lacks the following steps:

1. rotating at least a pair of first and second shells (disks are not shells);
2. injecting contaminated liquid at the input end of the rotating first shell (there is no input end because the water is flung off the disk); and
3. the rotation of the concentric shells is at an angular velocity sufficient for any liquid on the inner surface to form a film along the inner surface due to g forces on the liquid generated by the rotation of the shells.

Hervet, Patent No. 2,995,612, teaches a centrifugal contactor. Contactors are devices for separating two or more liquids of differing densities into their subsequent components or liquid phases. This patent discusses a method and means for obtaining a film-type contact between two liquids that are in centrifugal rotation. This means that one liquid forms a film or layer on another liquid by virtue of centrifugal force acting on differing densities, analogous to a centrifuge. One of the primary purposes for creating a film-type surface between two liquids – in this case an acid and hydrocarbon phases – is to facilitate the "reaction contact time" of the two liquids. Rotation enhances the effective gravity to separate the liquids of differing densities, and promote and control an exothermic reaction of these liquid species at that interface.

Rotation does not enhance the thermodynamic heat transfer capabilities across a shell boundary to create a phase change process for distillation as applicants claim.

Hervert lacks at least the following elements:

1. rotating at least a pair of first and second shells for the purpose of enhancing thermodynamic heat transfer;
2. injecting contaminated liquid which boils along the inner surface of the one of the shells;
3. compressing the vapor generated by boiling and directing the vapor into the other shell; and
4. condensing the vapor on the outer surface of the shell from which the water boiled from the inner surface.

Thus, the three references do not teach all the claim elements, and there is no reason to combine them anyway.

The office action states:

Thus, in the absence of anything which may be "new" or "unexpected result," a *prima facie* case of obviousness has been reasonably established by the art and has not been rebutted. Unexpected results must be established by factual evidence. Mere arguments or conclusory statements in the specification, applicants' amendments, or brief do not suffice.

Citing *In re Lindner*, 457 F.2d 506, 508, 173 U.S.P.Q. (BNA) 356, 358 (C.C.P.A. 1972) and *In re Wood*, 582 F.2d 638, 642, 199 U.S.P.Q. (BNA) 137, 140 (C.C.P.A. 1978).¹ In both cases, the board found that the examiner had established *prima facie* obviousness. *Lindner*, 457 F.2d at 508; *Wood*, 582 F.2d at 641. Thus, unexpected results had to rebut *prima facie* obviousness for the claims to be non-obvious.

Moreover, the court in *In re Soni*, 54 F.3d 746, 34 U.S.P.Q. 2d (BNA) 1684 (Fed. Cir. 1995), relied on unexpected results in the specification because the

¹ The office action's citation to *Lindner* was incorrect.

specification contained data. *Id.* at 750. *Soni* also distinguished *Lindner* and *Wood*. The present application has significant data. Though it is not test data, the results were calculated using known heat transfer equations and coefficients. Thus, insofar as applicants must establish unexpected results, the application supplies the necessary information.

Had the office action here presented a *prima facie* case of obviousness, the cases might apply. However, the office action failed to establish *prima facie* obviousness. Thus, there is nothing that needs rebutting.

Therefore, we submit that the combination of references does not create *prima facie* obviousness necessary to sustain a § 103 rejection. Accordingly, we request withdrawal of the § 103 rejection.

We canceled claim 20 and added claim 21. We believe that it also distinguishes the prior art and is not obvious.

C. CONCLUSION

We submit that claims 19 and 21 contain allowable subject matter. Therefore, we request that the PTO issue a notice of allowance.

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